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# Introduction

1

Virus SARS-Cov-2 has influenced the whole world during 2019 and 2020 and continues to influence it. Several governments across the world decided to take restriction measures to avoid the infection. The system to be should work in order to make store’s customers able to line up digitally to enter a grocery store, or to make a reservation for a given time on a given day. This part of the document explains the purpose of the project, the scope, definitions and acronyms used, document’s revision history, reference documents and the document structure.

## Purpose

The system is aimed to be used on the Italian territory for a grocery store’s chain by customers of the stores. The system’s purpose can be divided in two different categories:

* **Service for customers**: a service is offered to grocery stores’ clients and is realized with a digital system. The service must allow users to queue online in order to access the store until is their time of entering and to book visits to the store later than at the time of reservation;
* **Avoiding crowds**: avoiding crowds is the aim of the system which is intended to substitute the classical lining up methods (tickets and queues).

The system is intended to be easily usable and accessible almost to everyone who has access to an electronic device where external applications can be installed. The system can be used by the user to queue and to see how much wait time there is to achieve the possibility to enter the store. These two system’s characteristics are used to ensure the goal of having the minimum amount of people waiting outside the store to be able to enter on it.

The system should be able to trace customers visits and to save customers mean visit time and store it for future computations. Once the system has traced a certain number of visits of a customer, it would be able to estimate the visit duration time for it and use this estimation to compute the number of people able to access the market at that visit time. The system should trace every customer which visits the store and save the visits durations in order to be able to compute the mean time of a visit for that client.

The system should be possible to be used parallelly to a physical system of lining up at the store’s entrance for those people who cannot afford the application due to technology limitations. The system goal is to balance the digital queue with physical queue of people which cannot use the digital system.

Goal of the system can then be summarized as follows:

* Goal 1: user can wait its turn from home until is called;
* Goal 2: user can book a visit to the store;
* Goal 3: user can optionally insert the approximate duration of the visit;
* Goal 4: user can optionally insert items or the items’ category they intend to buy;
* Goal 5: system provides a precise estimation of waiting time to the user;
* Goal 6: system alerts the user about the time they need to reach the store;
* Goal 7: system suggests alternative time slots in case the one requested is full;
* Goal 8: system can suggest other stores to the user;
* Goal 9: system can give periodic notification of available time slots to the user;
* Goal 10: system output a QR to the user to identify its digital queue number and it is unique.

## Scope

The system is put on an environment composed of different entities which are part of the world: customers, store and security staff. System is used by different entities like customers, security staff and the store. With security staff we intend the people involved in the activity of controlling people’s numbers when a number is called and a person says it’s his number.

It follows the list of world (only) phenomena:

* User select a store to buy things;
* User opens the application;
* User goes to the store;
* User shows its number to security staff;
* User takes its shopping items;
* User pay.

It follows the list of shared phenomena:

* The store sets the maximum amount of people for a group;
* The store sets the maximum amount of people inside a certain sector;
* User enters in the (digital) queue;
* User checks the estimated waiting time;
* User books a visit;
* User inserts the items or items’ categories in to-buy list;
* User inserts the approximate duration of the visit;
* User receives an alert about the time needed to get to the store;
* User receives a list of alternative time slots;
* User receives a list of alternative stores;
* User receives a notification of a free slot;
* User shows the QR code representing their number to the security staff;
* User goes out and shows their QR code;
* Security staff controls a QR code shown by a user.

It follows the list of machine phenomena:

* System computes the number of a client;
* System calls a number;
* System verifies if a number is the number of the customer which should enter;
* System computes the estimated waiting time (for each customer);
* System computes mean duration of a visit for a long-term customer;
* System evaluates the distance between the customer and the store;
* System finds alternative time slots;
* System finds other near stores.

## Definitions, acronyms and abbreviations

## Revision history

1. Versions with early reasonings:
   1. Initial draft about world phenomena, shared phenomena, machine phenomena, user characteristics and domain assumptions,

## Reference documents

1. http://dati.istat.it/Index.aspx?DataSetCode=DCCV\_ICT

## Document structure

# Overall description

2

Introductory text to the chapter (how it is subdivided and what are we going to say in the chapter)

## Product perspective

## Product functions

## User characteristics

This section presents the users and their characteristics:

* **Store**
  + They are in charge of their store’s organization. In particular they decide the opening hours, and the maximum number of people for each ward.
* **Customers**
  + They can be of any demographics. Shopping for groceries is a need that everybody has.
  + Their ability to interact with technology varies greatly. While younger generations are accustomed to use technology the elderly might struggle to use complex applications.
  + Even though in developed countries the vast majority of customers is expected to have internet access at home, a sizable portion still doesn’t. According to a 2020 statistic, in Italy 76% of households has it.[1]
  + Normally customers go grocery shopping with a least a vague idea of the items to buy.
  + The time spent in the store by costumers varies greatly. It can usually be loosely predicted by the costumers.
* **QR code controllers**
  + They are workers who control the flow of customers at the entrance of the store.

## Assumptions, dependencies and constraints

1. Customers are not allowed to enter unless they have received a ticket or they have booked a visit.
2. Customers can get their ticket by either using their app or physical machines at the store, and in no other way. Visits can be booked by using the app, and in no other way.
3. The maximum number of people allowed to be in a store sector at the same time N is known.
4. Customers who book a visit and declare in advance their intended actions will respect their declarations, i.e. they will not visit sectors other than the declared ones (this could be achieved by granting special discounts to those that do respect their declarations or by enforcing sanctions if a customer buys a product from another section) \*to move somewhere else.
5. Customers who book separate visits/ get different tickets will not get in direct contact inside the store, thanks to some employees in charge of controlling their behaviour.
6. Access to the store by ticket (i.e. for the queuing customers) is granted if and only if the customer's ticket number has been called and the next ticket number has not been called yet.
7. Customers who leave the store make their ticket or booking no longer usable, regardless of what they purchased, i.e. they need a new ticket or the booking of a new visit to enter again. \*requirement maybe
8. Customers enter one group at a time.
9. Each booking requires the specification of the number of people that will make the purchases withing the same group.
10. Customers who get a ticket through their app must show their QR code in order to prove the validity of the ticket, either on their phone or on paper.

# Specific requirements

3

Introductory text to the chapter (how it is subdivided and what are we going to say in the chapter)

## External interface requirements

### User interfaces

### Hardware interfaces

### Software interfaces

### Communications interfaces

## Functional requirements

## Performance requirements

## Design constraints

### Standard compliance

### Hardware limitations

### Any other constraint

## Software system attributes

### Reliability

### Availability

### Security

### Maintainability

### Portability

# Formal analysis using alloy

4

Introductory text to the chapter (how it is subdivided and what are we going to say in the chapter)

# Effort spent

5

This part is the part which summarize the effort spent by each member of the team in the documentation building process.

|  |  |
| --- | --- |
| **Davide Li Calsi** | |
| Introduction | 0hrs |
| Overall description | 0hrs |
| Requirements | 0hrs |
| Alloy | 0hrs |

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| --- | --- |
| **Andrea Alberto Marchesi** | |
| Introduction | 0hrs |
| Overall description | 0hrs |
| Requirements | 0hrs |
| Alloy | 0hrs |

|  |  |
| --- | --- |
| **Marco Petri** | |
| Introduction | 2.5hrs |
| Overall description | 0hrs |
| Requirements | 0hrs |
| Alloy | 0hrs |

# References

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Introductory text to the chapter (how it is subdivided and what are we going to say in the chapter)